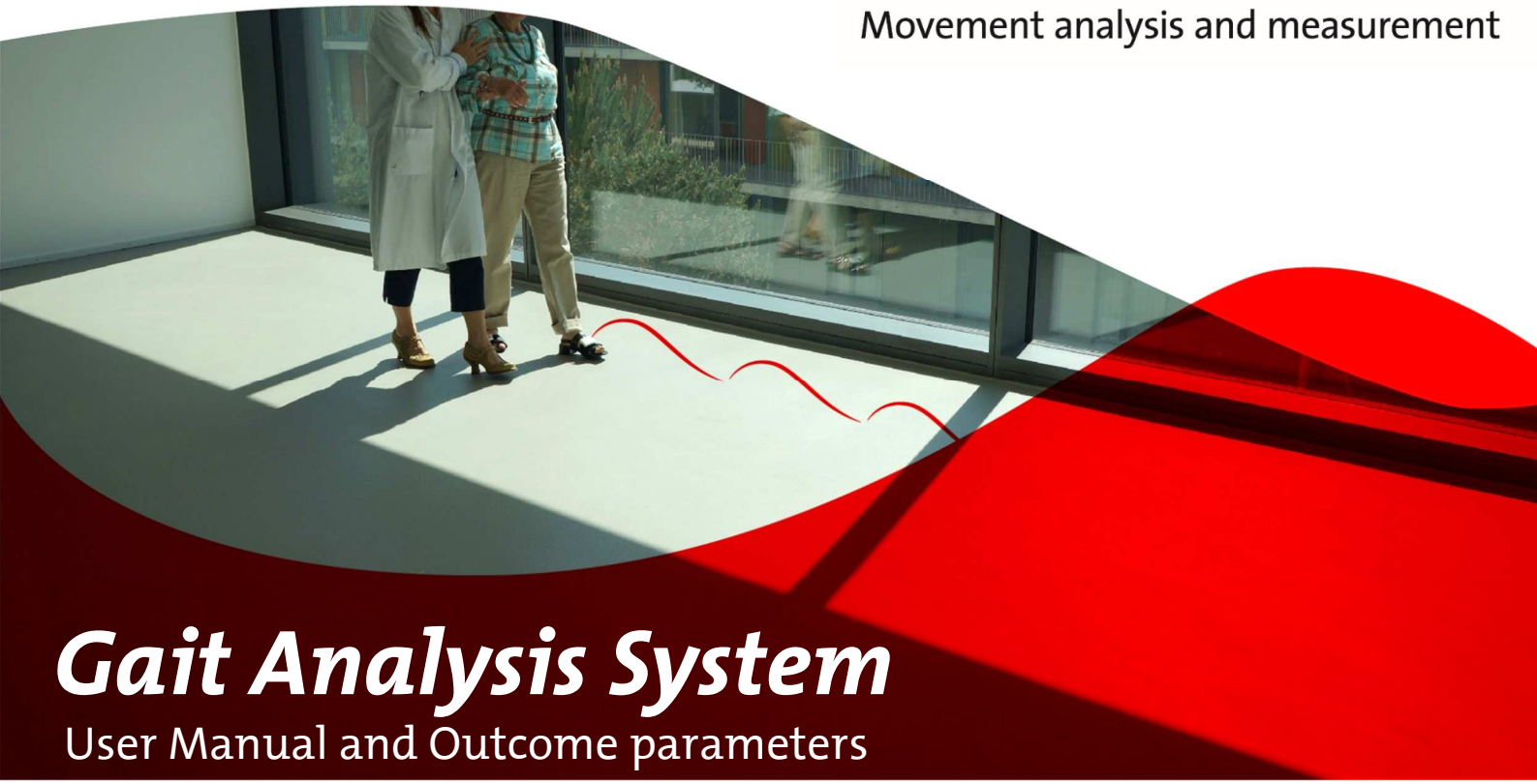
Gaitup

Movement analysis and measurement



Gait Analysis System

User Manual and Outcome parameters

Thank you for purchasing our Gait Analysis Package. Gait Up's goal is to provide you with a user-friendly setup to measure accurately 3D gait performances. We hope you will enjoy working with your 3D Gait Analysis Package, and we welcome your suggestions for future improvement.

Physilog®4 is the world's thinnest 10D wearable sensor. Together with Gait Up software, it offers in-lab precision for in-field applications. It provides objective and quantitative assessment of spatio-temporal gait performance.

Rev. 2.2
Release date : 20.10.2015

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Gait Analysis Package

- Transport/storage suitcase
- Gait Up Software
  License on USB key
- Physilog® Sensor (x 2)
  Physilog® 4 Silver 10D
- Foot attachment straps (x 2)
- USB>micro USB cables (x 2)
- Contact Card

Recording with Physilog®

Attach

- Fix the dedicated straps around subject's foot (thin elastic part below the foot, plastic dots heading to the shoe, soft velcro on top of the foot).
- Put the Physilog® on the strap

Start

- Press the button for 1-2 seconds
- The LED is blinking green every second
- Make sure LEDS from the 2 sensors are blinking synchronously
- **> Physilog® is recording**

Walk

- Ask the subject to walk according to your protocol

Stop

- Once the subject has finished, press again on the button for a few seconds
- The LED shines orange, then blinks 3 times green and then turns off
- **> Physilog® has created one file and stopped recording**

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Gait up
Movement analysis and measurement

Charging and Data Transfer

Plug

- Plug the micro USB to the Physilog®
- Plug the USB to the Computer or Charger*

Charging

- When connected to the computer via USB port or a charger*, the LED blinks orange
- **> Physilog is charging**
- When it is fully charged, it shines green

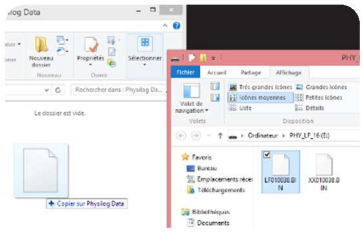
*Charger is not provided by Gait Up. Gait Up declines any responsibility due to charger usage. Please refer to supply voltage in the product specification section.

Connect

- When connected to a computer, the LED is blinking multicolor
- Wait for few seconds
- **>Physilog® is connected to your computer**

Transfer

- Copy and paste Physilog® files (*.bin) to your preferred destination



Analysis with Gait Analyser Software

Plug

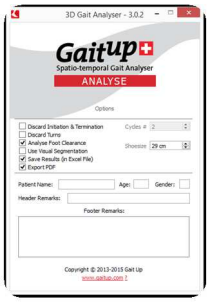
- Plug the USB with Gait Analyser Software

Open

- Open Gait Up software from USB key location

Analyse

- Choose your options (details below) and click «Analyse»
- Select your Physilog® files to be analysed



Interpret

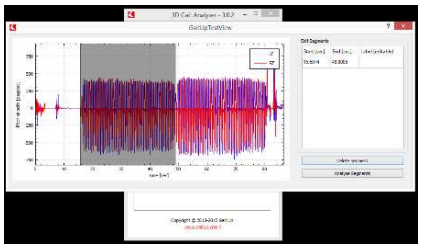
- Use following pictures to interpret parameters
- Compare obtained values between subjects or with reference data

3D Gait Analyser options*

- To analyze forward gait without extrinsic variations, you can exclude a chosen number of the **first and last cycles** and the **turns**. We recommend to discard two steps for initiation and termination – Yuancheng J. et al. 1993).

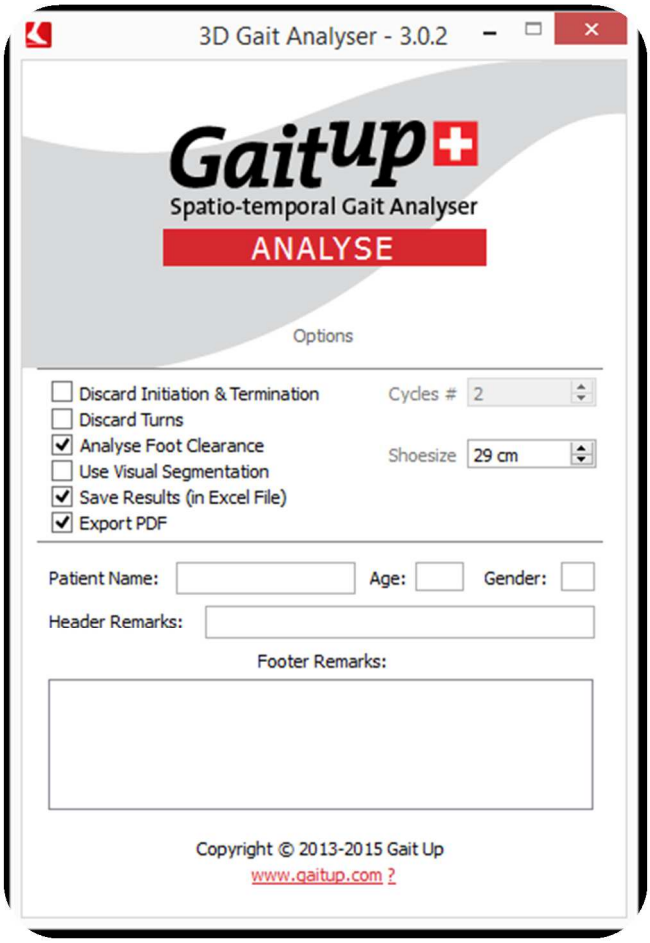
- For **foot clearance analysis**, the shoesize (from heel to tip) needs to be specified in cm. Make sure to measure this parameter if you are interested in clearance parameters.

- It is possible to choose a part of the trial for analysis using **visual segmentation**. A window displaying raw data will open and you can select the period(s) of interest by right clicking while keeping pressed and moving the cursor.



- An **Excel file** and/or a **pdf report** can be generated by the software. The pdf gives the statistics of all the parameters and the excel file provides in addition the values per cycle.

- At the bottom part you can add information about the subject performing the gait test and additional **notes** appearing at the top or bottom of the pdf report.

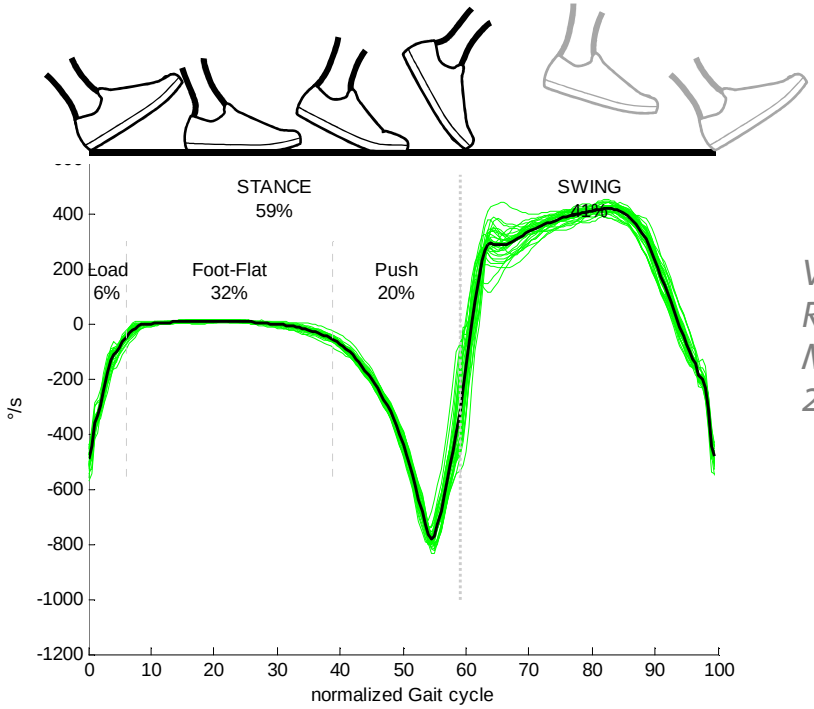


* The available options may vary for different versions of the software. In this manual, V3.0.2 is described.

Important Remarks

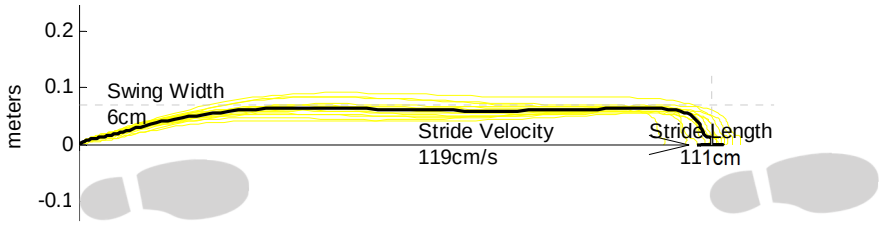
- Sensors can be placed on the foot in any orientation, it will not influence gait measurements.
- Make sure Physilog® sensors are fully charged before doing measurements (LED either shining green or off while plugged) to benefit from the maximal battery life.
- Don't forget to measure shoesize (i.e. heel-to-toe distance) to be able to analyse Foot Clearance.
- Make sure to know which «.bin» file corresponds to which trial for your analysis – Last digits of file name are automatically incremented. Note that date of file generation (recorded between one start and stop of the Physilog®) is visible in the XLS file.
- Make sure to plug the USB cable in the right way: contact pins should be centered.
- Note that Gait Up software cannot be copied: it only works when the USB key containing the Physical License is plugged.
- Do not remove file «INFOFILE.GTU» from your Physilog®'s memory and do not reformat Physilog®
- Gait Up's algorithm provides accurate results during normal walking on flat ground. Don't use it for stairs, slopes or other daily activity and ensure no movements while recording before and after gait trial.
- Refer to Physilog®'s user manual concerning handling & warnings, warranty and specifications. You will find it on the download section of our website

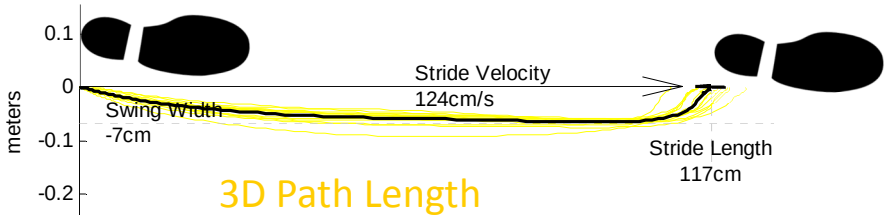
Temporal Analysis



Validated against pressure insoles.
Reference:
Mariani et. al, Gait & Posture, 2012

Spatial Analysis





3D Path Length

Validated against Optical motion capture.
Reference:
Mariani et. al, IEEE TBME 2012

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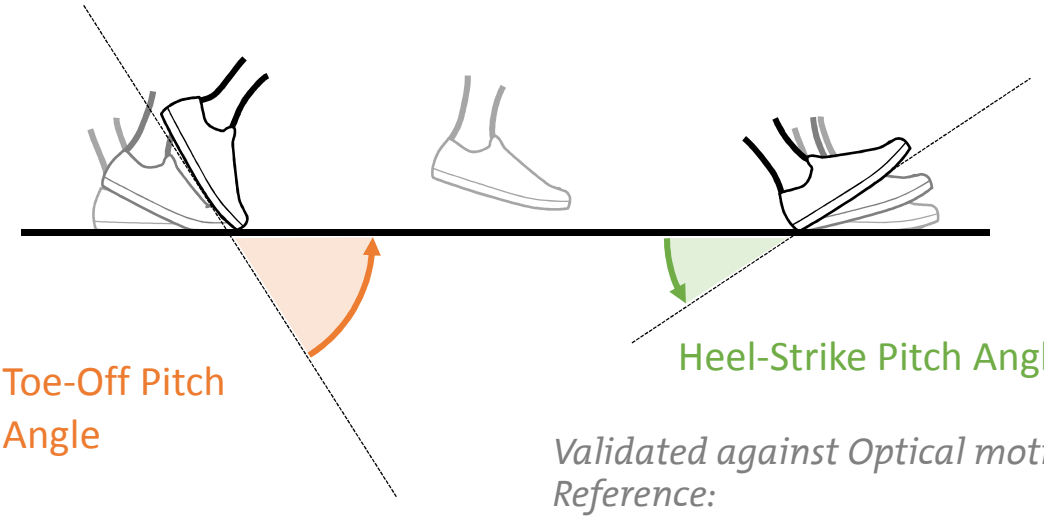
Spatial Analysis 2

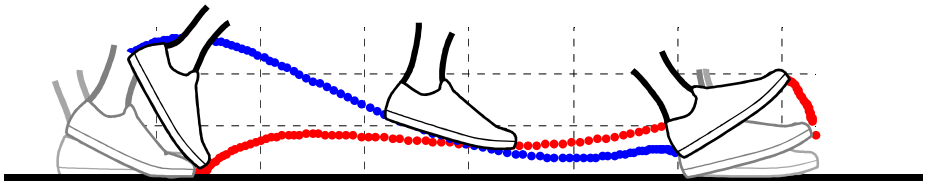


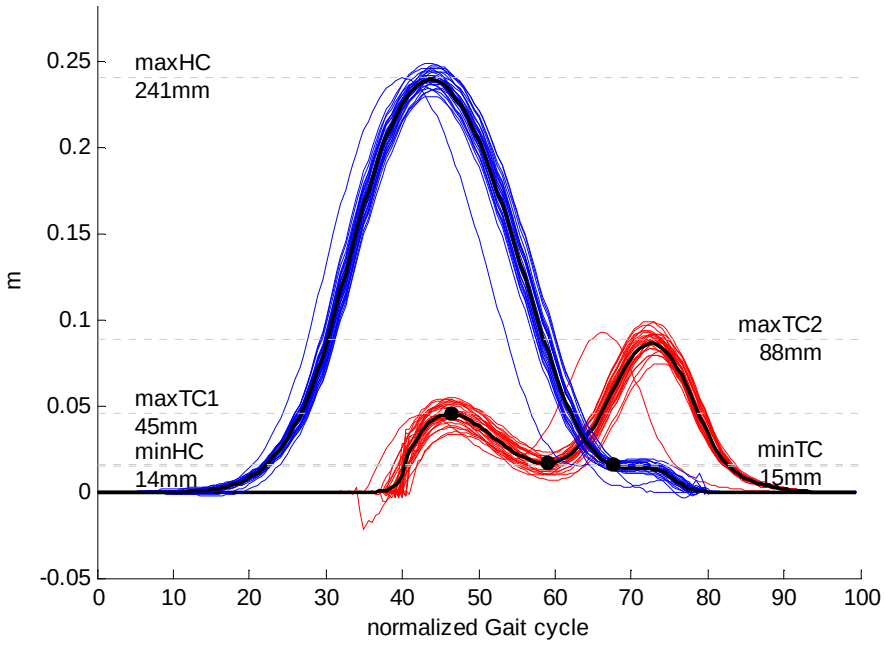
Toe-Off Pitch Angle

Heel-Strike Pitch Angle

Validated against Optical motion capture.
Reference:
Bregou et. al, Gait & Posture, 2013

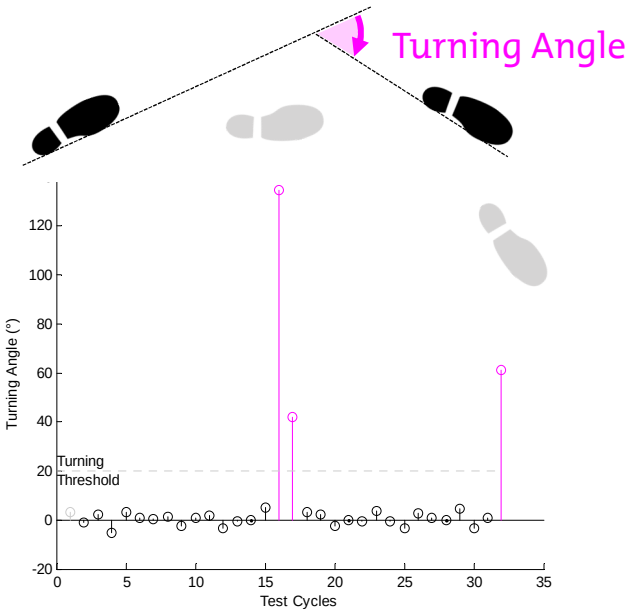
Clearance Analysis





Validated against Optical motion capture.
Rererence:
Mariani et. al, IEEE TBME, 2012

Turning Analysis



Validated against Optical motion capture.
Reference:
Mariani et al. Journal of Biomechanics, 2010

Outcomes Names in XL file

- For Right and Left Side (_R, _L):
  - Temporal:
    - Heel strike time (HS) – absolute time of the test at which to foot touches the ground
    - Gait cycle time (gct), Swing and Stance ratios (swing, stance), Cadence (cadence)
    - Inner-Stance phases: Load, Foot-flat and Push ratios (LDr, FFr, PUr)
    - total Double-support (DS)
  - Spatial:
    - Stride Length (slength)
    - swing width (swidth), 3D Path length (Pathlength)
    - Gait Speed (speed)
    - Maximal angular velocity during swing (peakswing)
    - Foot Pitch Angle at Toe-off and Heel-strike (TOP, HSP)
  - Clearance:
    - Maximal Heel clearance (maxHC)
    - Minimal, first and second maximal Toe clearance (minTC, maxTC1, maxTC2)
    - Foot Speed Norm at minimal toe clearance (mtcS)
- Statistics
  - For all parameters: mean, median, std, iqr, min, max, and when it makes sense: Coefficient of variability (CV)

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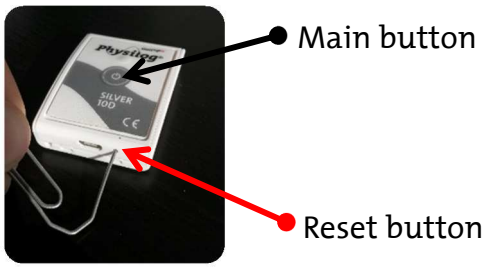
Troubleshoot



1. First, Visit FAQ on the website:
   http://www.gaitup.com/download
2. If Physilog® is not working properly, please do a simple reset:
   Press the reset button once. LED blinks ORANGE, then RED
3. If Physilog® is really not working, please do a master reset:
   Maintain the reset button, then maintain main button, release the reset button, and once LED has stopped blinking, release main button. LED blinks ORANGE 3 times
   Warning: this operation formats the device and data stored on the Physilog® will be lost
4. If you still have a problem, email it to: contact@gaitup.com,
   Please indicate Physilog®'s number and attach problematic .bin files if any

At Gait Up, we welcome your feedback and questions.

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